

CLAIMS

What is claimed is:

1. A method of detecting a target in a sample comprising the target, the method comprising

(a) contacting a microarray with the sample, the microarray comprising a plurality of features disposed on a substrate, each feature comprising a first electrode disposed on the substrate, a second electrode disposed on the substrate, and a probe disposed between the first electrode and the second electrode, the substrate comprising integrated addressing circuitry in operable relation to each of the plurality of features,

(b) applying an enhancement reaction to the plurality of features to result in a change in an observable property of at least one of the plurality of features;

(c) providing a signal to the addressing circuitry to select one of the plurality of features to be interrogated;

(d) measuring the observable property at the selected feature,

(e) repeating steps (c) and (d) to selectively interrogate each of the plurality of features; and

(f) analyzing the results obtained from step (d) to detect the target.

2. The method of claim 1 wherein the observable property is selected from the group consisting of resistance, impedance, conductance, capacitance, current, potential, and transmission of a signal between the two electrodes.

3. The method of claim 1, further comprising (g) attaching a label to the target prior to applying the enhancement reaction.

4. The method of claim 3, wherein the label comprises a nanoparticle selected from the group consisting of a gold nanoparticle and a silver nanoparticle.

5. The method of claim 4, wherein the enhancement reaction deposits metal onto the nanoparticle.

6. The method of claim 3, wherein the label is attached to the target via a conjugate binding pair selected from the group consisting of biotin-avidin and digoxigenin-antidigoxigenin.

7. The method of claim 1, wherein a plurality of targets are detected.

8. A microarray comprising a plurality of features disposed on a substrate, each feature comprising a first electrode disposed on the substrate, a second electrode disposed on the substrate, and a probe disposed between the first electrode and the second electrode, the substrate comprising integrated addressing circuitry in operable relation to the features, the addressing circuitry operable to select a given feature to allow interrogation of the selected feature.

9. The microarray according to claim 8, wherein each feature further comprises a pad of resistive material disposed between the first electrode and second electrode of the feature, the probe of the feature being supported on the pad of resistive material.

10. The microarray according to claim 8, wherein the substrate comprises measurement circuitry in electrical communication with the addressing circuitry, the measurement circuitry being operable to interrogate the given feature selected by the addressing circuitry.

11. The microarray according to claim 8, wherein the substrate comprises integrated storage means in operable relation to the addressing circuitry.

12. The microarray according to claim 9, wherein the pad of resistive material comprises a material selected from the group consisting of carbon thin film, metal thin film, metal nitride, nichrom (NiCr), tantalum nitride (Ta₂N), silicon chrome, and metal oxide.

13. The microarray according to claim 8, wherein the probe comprises at least one of the group consisting of polypeptides, polynucleotides, glycoproteins, polysaccharides, hormones, growth factors, peptidoglycans, ribonucleotides, deoxyribonucleotides, modified nucleosides, peptide nucleic acids, and oligomeric nucleoside phosphonates.

14. The microarray of claim 9, wherein each of the plurality of features comprises a different probe.
15. The microarray of claim 9, wherein the microarray comprises at least one reference feature in operable relation to the addressing circuitry.